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Reducing the Risk of In-Field Feeding Systems: Wintering Site Assessment and Design Tool

A Guide to selecting and Managing a Wintering Site in Western Canada

Managing for Good Environmental Stewardship

Manure Management Update 2015

Dennis Lastuka

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Lethbridge, AB

Canada

Wintering Site Mgt -

What is a wintering site?

A site where cattle are fed, watered, and sheltered during the winter. The site includes the feeding, bedding, and watering areas **plus** the remaining areas the cattle have access to.

Wintering Site Mgt -

Why is it important?

There are BENEFITS

- Economics – trend to move from intensive to extensive feeding
  - Reduced costs
  - Improved nutrient distibution; improved yields
- Nutirents placed in larger areas
  - Importing nutrients
  - Convert feed into nutrients
- More options
  - Different type of feeding strategies – 365 days of grazing
  - Different types of feed
- Post wintering site utilization

Winter Feeding Systems

- Different Feeding Strategies for different landscapes
  - All of these extend the grazing season

- Divided in 2 groups
  - Non – Imported Feeding Systems
    - Lower Input Feeds
    - High Input Feeds

  - Imported Feeding Systems

Feeding Systems

Winter Feeding Systems

BENEFITS Why does all this matter?

Approximate Densities and Nutrient Deposits for Various Feeding Strategies on One Acre

Imported Feeds

Non-Imported Feeds

Table 4. Approximate Densities and Nutrient Deposits for Various Feeding Strategies on One Acre

Feeding Strategy	Feed Density per acre	Cow Days per acre	Nitrogen per acre* [1] Available Nitrogen 1st yr.	P_2O_5 per acre [2] Available P205 1st yr.	Available Nutrient Value 1st yr per acre*
Bale Grazing	25 bales weighing 1300 lbs	844	572 lb/ac 172 lb./ac = $102.96/ac	112 lb/ac 56 lb./ac = $31.82	$134.78
Processed or unrolled bales	5 bales of 1300-lb bales	169	114 lb/ac 34 lb/ac = $20.59/ac	22 lb/ac 11 lb./ac = $6.36	$26.96
Standing corn grazing	4.5 tons	234	158 lb/ac 48 lb/ac = $28.51/ac	31 lb/ac 15 lb./ac = $8.81	$37.32
Swath grazing annual crops	2.25 tons	117	79 lb/ac 24 lb/ac = $14.26/ac	15 lb/ac 8 lb./ac = $4.41/ac	$18.66
Stockpiled perennial forages	1.5 tons	78	53 lb/ac 16 lb./ac = $9.50/ac	10 lb/ace 5 lb./ac = $2.94/ac	$12.44
Feeding annual crop residues	1 ton	52	35 lb/ac 11 lb./ac = $6.34/ac	7 lb/ac 3 lb/ac = $1.96/ac	$8.29

Note: All of the above examples assume a 1400-lb cow and feed with 11% protein and 0.15% phosphorus content. Actual densities and nutrient deposits may vary considerably depending on numerous factors.

* Prices of nitrogen and phosphorus are based on the 5-yr averages for 2007 to 2012 : average price of nitrogen(46-0-0) is $604.05/T ($0.60/lbs.); and average price of P_2O_5 is $798.14/T ($0.57/lbs.); Alberta Agriculture Statistics.

[1] Available Nitrogen in the first year; approximately 30% of total Nitrogen depending on numerous factors.

[2] Available P_2O_5 in the first year; approximately 50% of total P_2O_5.

Wintering Site

Why is it important?

There are also CHALLENGES

- Site Characteristics – cannot change most of them
- Weather
- Wildlife issues
- Nutrient utilization – 3 R's (Right place, right time, right amount)
- Runoff control
  - Increased soluble nutrients
- Public perception – eg. eating snow

Wintering Site

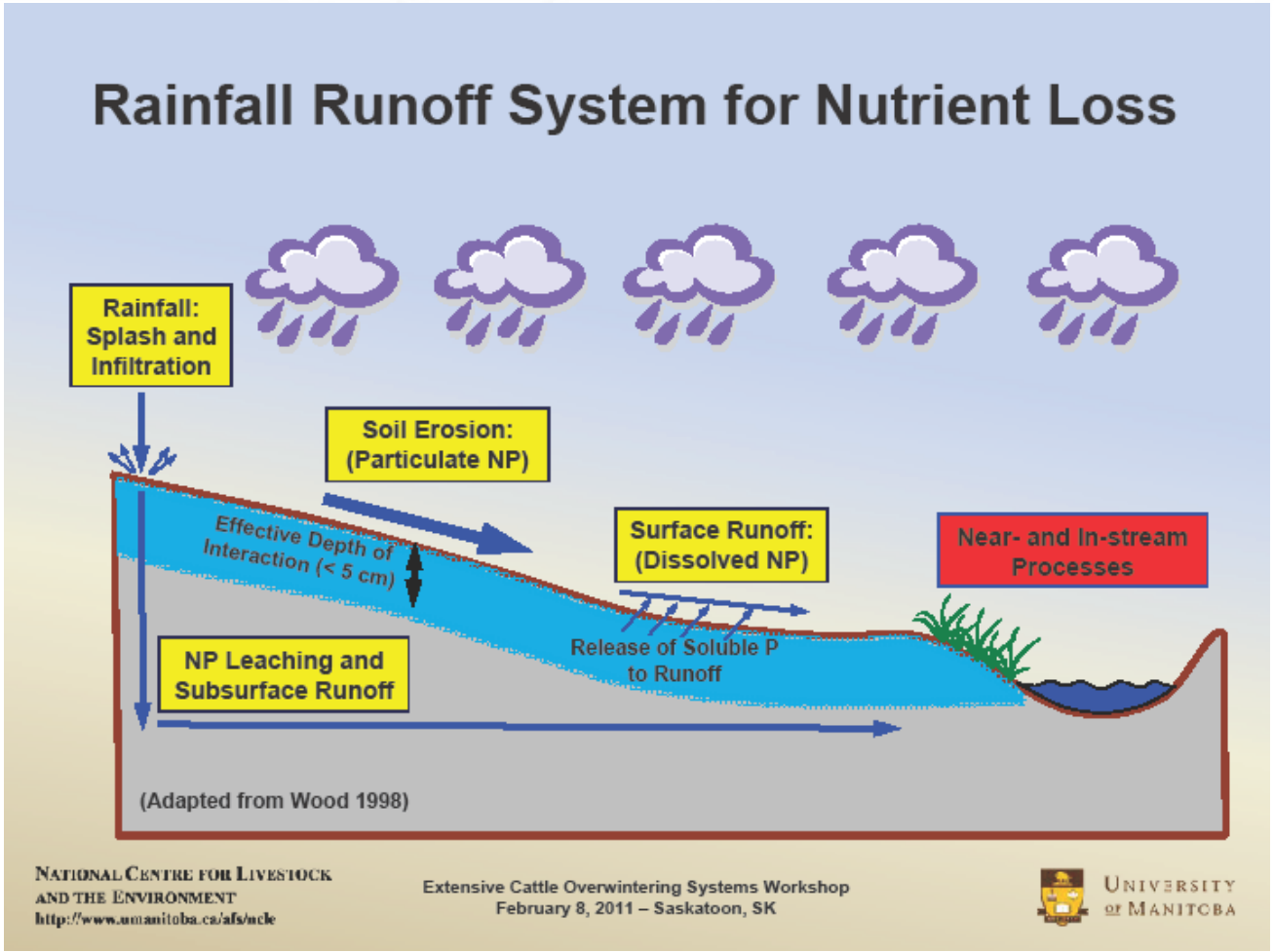
Why is it important?

CHALLENGES

- 200 days of winter feeding (Oct – Mid May)
  - could be a maximum of 245 days
    - » Grazing is on 165 days or as little as 120 days
- Runoff
  - Hard to predict at feeding how much snow will accumulate on that feeding area by the time runoff occurs

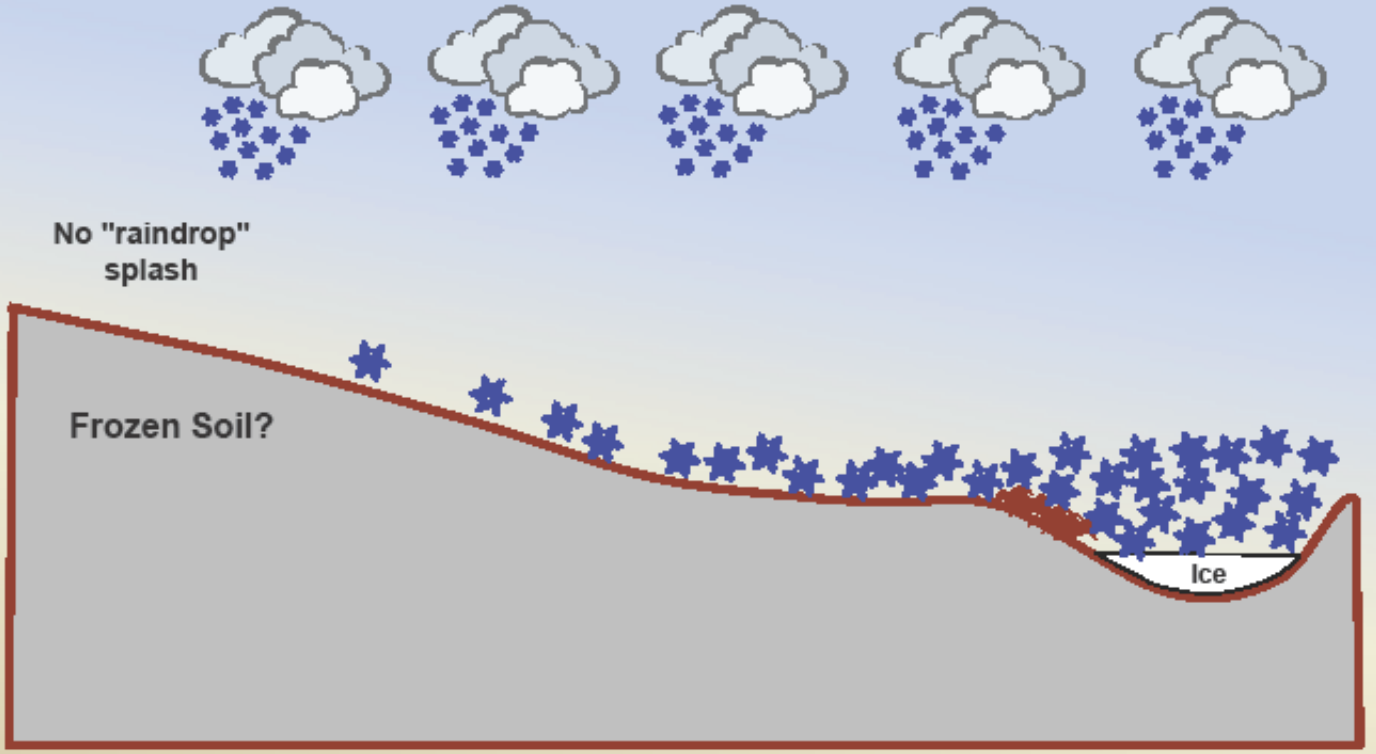
Wintering Site Management

Why is winter different?



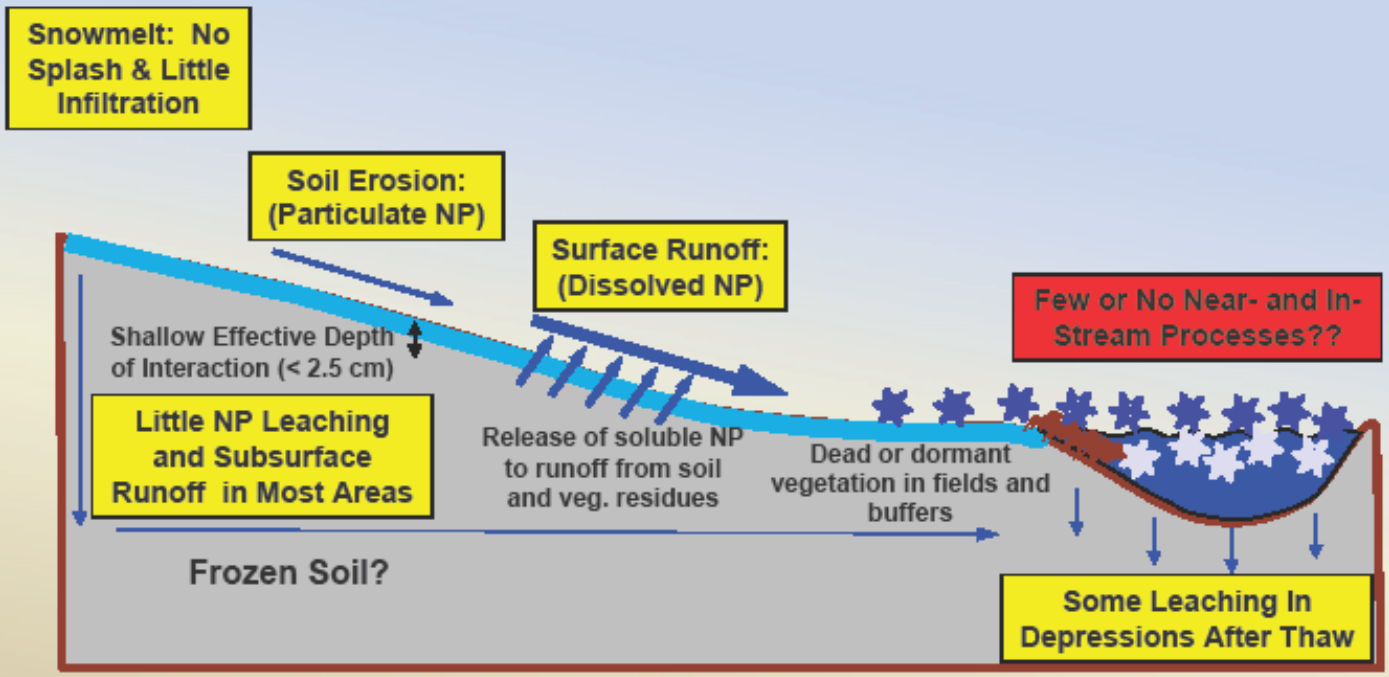
Wintering Site Management

Snowmelt Runoff System for Nutrient Loss: Snow Accumulation & Redistribution Phase



Wintering Site Management

Snowmelt Runoff System for Nutrient Loss: Melt Phase



National Centre for Livestock and the Environment
http://www.umanitoba.ca/afs/ncle

Extensive Cattle Overwintering Systems Workshop
February 8, 2011 – Saskatoon, SK

University of Manitoba

Wintering Site Assessment and Design Tool

Five components

What's all in the "TOOL"?

- Site characteristics
- Feeding strategies
- Bedding & shelter management
- Water source management
- Post-wintering site management

Site Characteristics

Quick look at what a producer has to work with

The natural characteristics of a potential or existing wintering site.

- soil zone
- soil type
- snowfall conditions
- flooding
- Runon potential
- Runoff potential
- Slope position (Upper, mid, lower)
- Slope steepness (take an average)
- Slope Length (same as EFP)
- Groundwater (>100 ft - <25ft)
- Bare ground
- Site History

Wintering Site Assessment and Design Tool

Steps for Using WSADT Charts

1. In each WSADT chart, identify your current situation in the left-hand portion of the chart.
2. Consider the level of environmental risk associated with your current situation.
3. Consider the potential concerns.
4. Consider the options for BMPs to address the concerns.
5. Go to the Resources section of this publication to find detailed information to help you decide which particular BMPs would best meet the needs of your own operation.

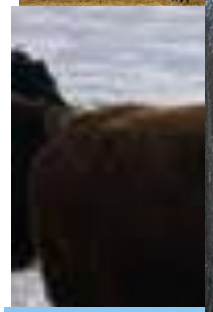
Example:

Site Characteristic	Environmental Risk Factor and Risk Level			Potential Concerns	Beneficial Management Practices
Slope length of wintering site	Less than 300 ft	300 ft to 1300 ft (1/4 mile)	Greater than 1300 ft	With longer slopes, the potential for increased water flow/velocity and associated erosion and/or nutrient transport increases.	If possible, place feeding areas on slopes less than 300 ft in length. For longer slopes, add berms or other barriers to slow runoff.
Depth to groundwater	Greater than 100 ft	25 ft to 100 ft	Less than 26 ft	The risk of nutrients contaminating groundwater increases on sites with shallow, permanent water tables.	Move site to high ground or a location that is at least 25 ft above the water table.
Amount of bare ground on Perennial forage or annual cropland	Perennial pasture with <25% bare ground	Annual cropland with stubble and aftermath with 25 to 50% bare ground or perennial pasture with >25% bare ground	Annual cropland with >75% bare ground	There is a greater risk of nutrient, pathogen, and sediment movement into water sources if the site has little groundcover or crop residue.	Select a site with good groundcover or establish groundcover so that at least 75% of the surface is covered with plant material prior to winter feeding. For annual cropland, do not use fall tillage prior to winter feeding.

Feeding Systems - Non-Imported Feeds

Feeding Strategies

Stockpiled Forage



Swath Grazing

Feeding Bales from the same field

Feeding Systems - Non -Imported Feeds

High Input Feeds – Corn / Irrigated

- High Levels of Fertilizer
- Pesticides / Fungicides etc.

Feeding Systems - Imported Feeds

- *Imported F*

Bale Processor feeding

Feeding Silage

http://www.ranchers

ms/thread-
yType=flat&seC

Feeding Systems

Feeding Strategy

Feeding Intensity - How man Cow days/Ac?
- What percent of field is the feeding Area?

Feeding Intensity

Feeding intensity, or cow days per acre, refers to the number of animals fed for a specified period of time in a certain area. Nutrient loading increases with feeding intensity.

To calculate feeding intensity:

A. How many cows will be fed? 100

B. How many days will these cows be fed within this field? 90

C. How many acres will be used to feed these cows during this time? 80

(Acres are based on the size of the field in which the livestock have access to)

D. Cow days per acre = 112

(A X B / C)

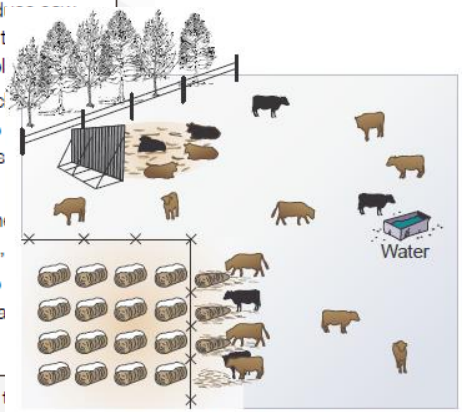
100 x 90/80 = **112**

Table 3 identifies the environmental risk levels for various feeding intensities, assuming all other factors are equal.

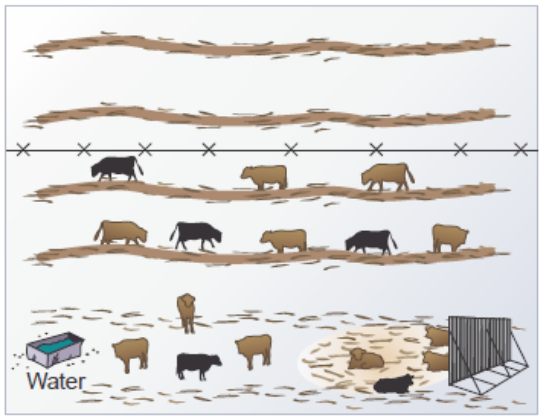
Table 3. Environmental Risks and BMPs Related to Feeding Intensity on Wintering Site Field

Percent of field which is the feeding area in 1 year	Cow Days per Acre/ Environmental Risk Level				Potential Concerns	Beneficial Management Practices
	<250	250 – 500	500 – 1000	1000 – 1500		
Most or all of the field	✓				Higher feeding intensities generate higher amounts of manure nutrients.	If possible, red… days per acre t… green risk level. This can be ac… • reducing the… days animals… the site, • increasing th… feeding area, • reducing the… animals fed a…
About half of the field						
Less than a third of the field (See illustrations on page 24)						

Note: It is recommended to never exceed 1500 cow days per acre. Corresponds to over 50 bales per acre relating … approximately 1000 lbs/ac of N and 150 lbs./ac of P_2O_5.



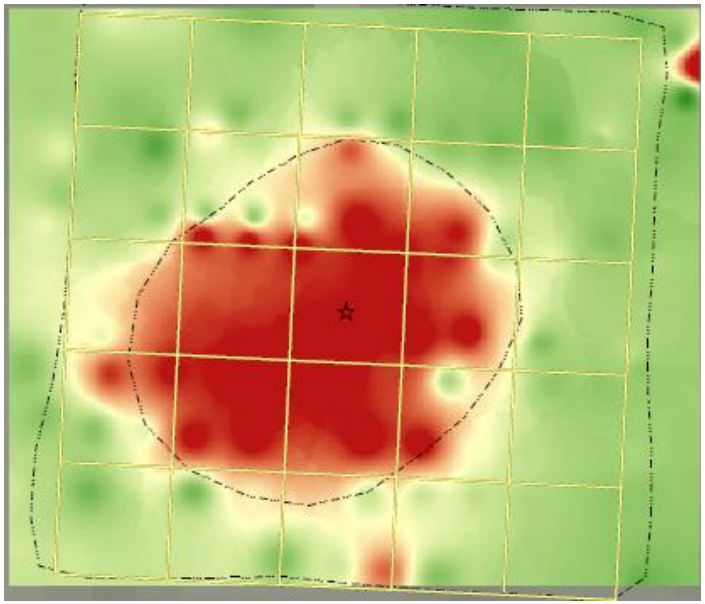
Less than a 1/3 of the field

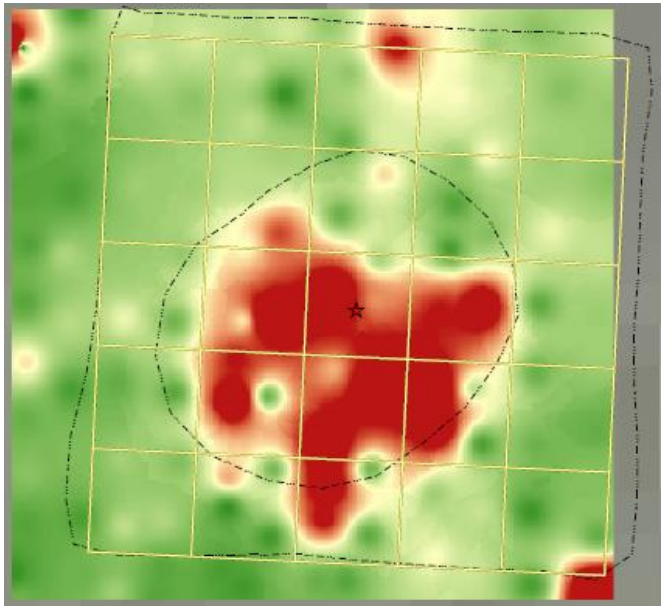


>50% of the field

50% of the field

Nutrient Density

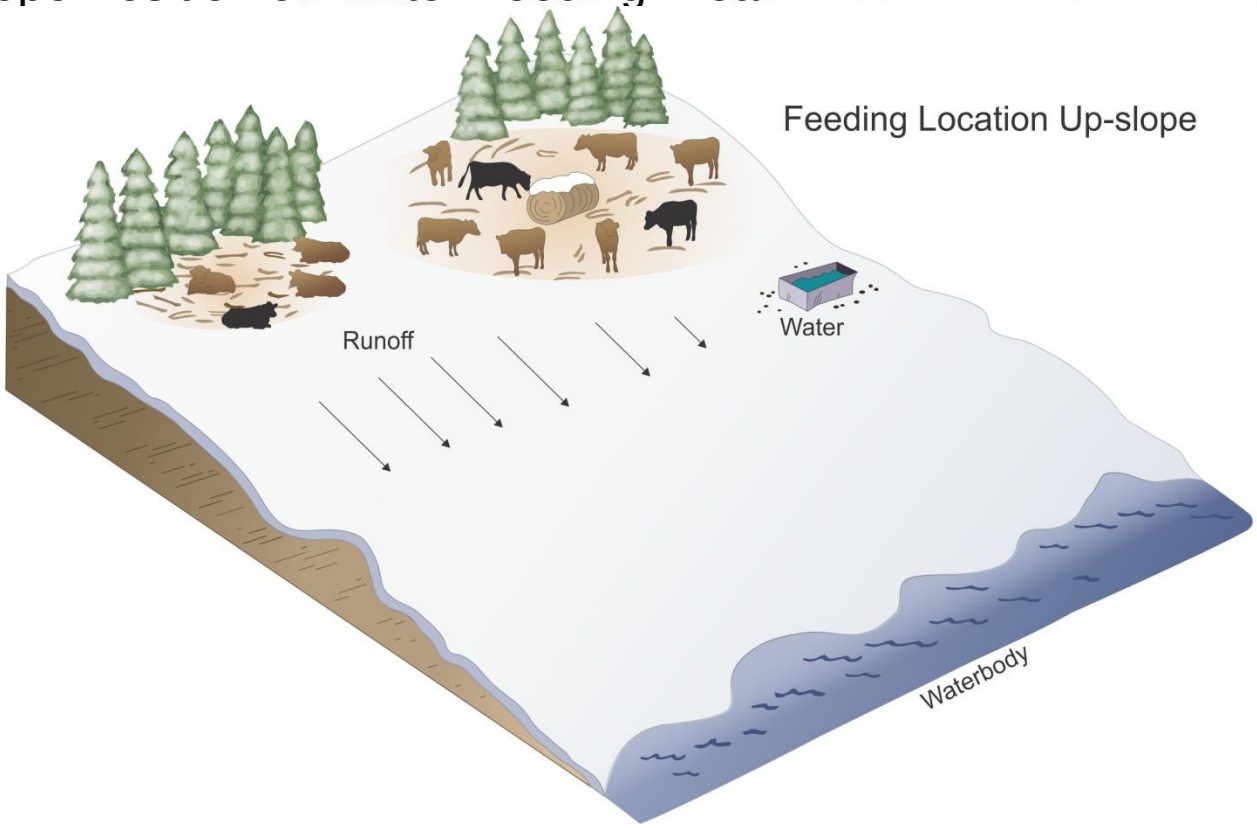




Wintering Site Assessment Tool

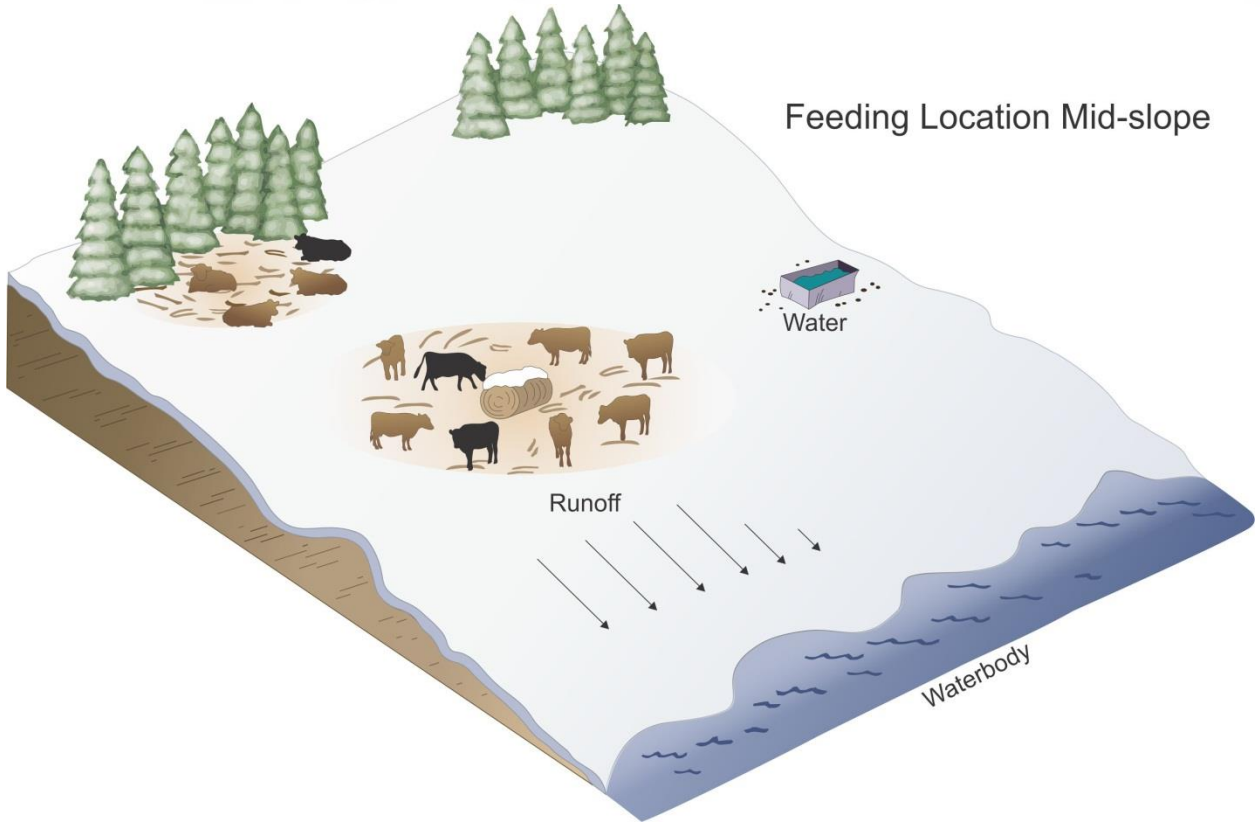
Site Characteristics

Slope Position of Winter Feeding Area



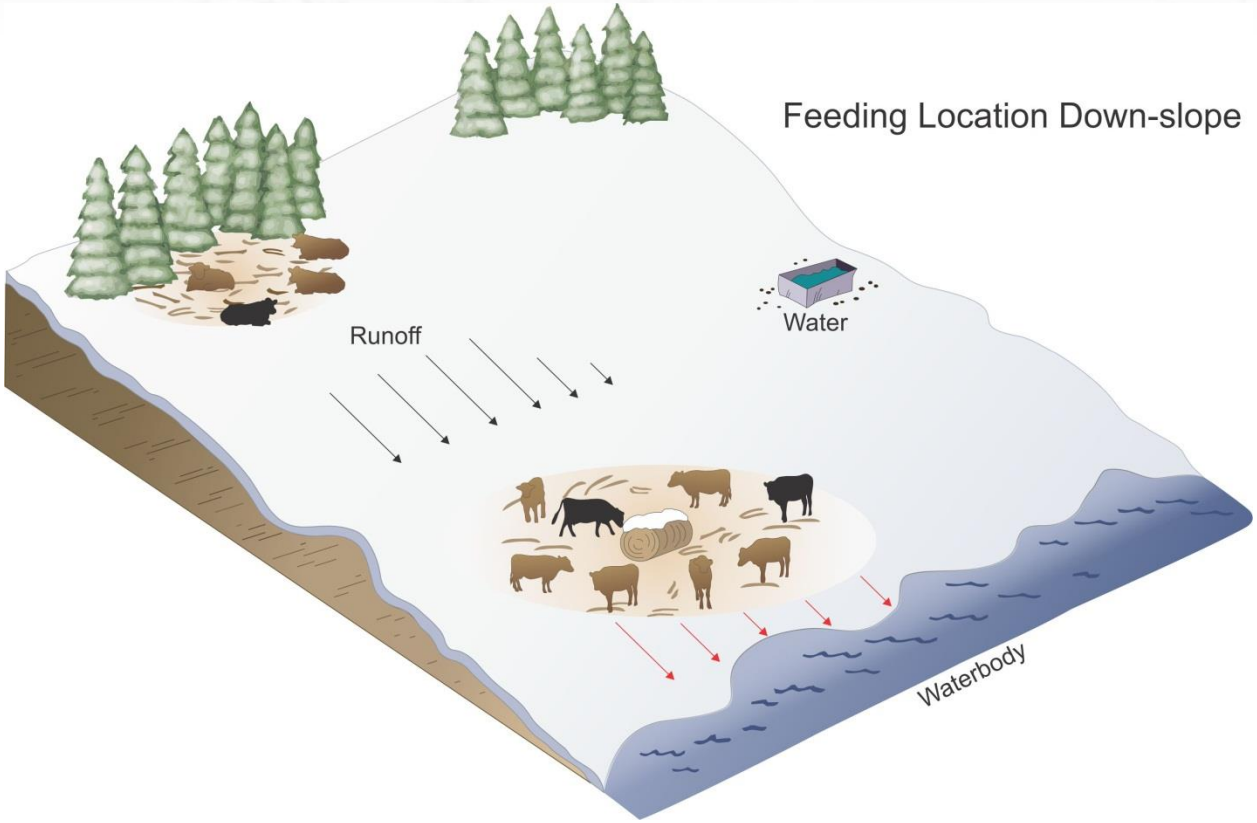
Wintering Site Assessment Tool

Site Characteristics
Slope Position of Winter Feeding Area



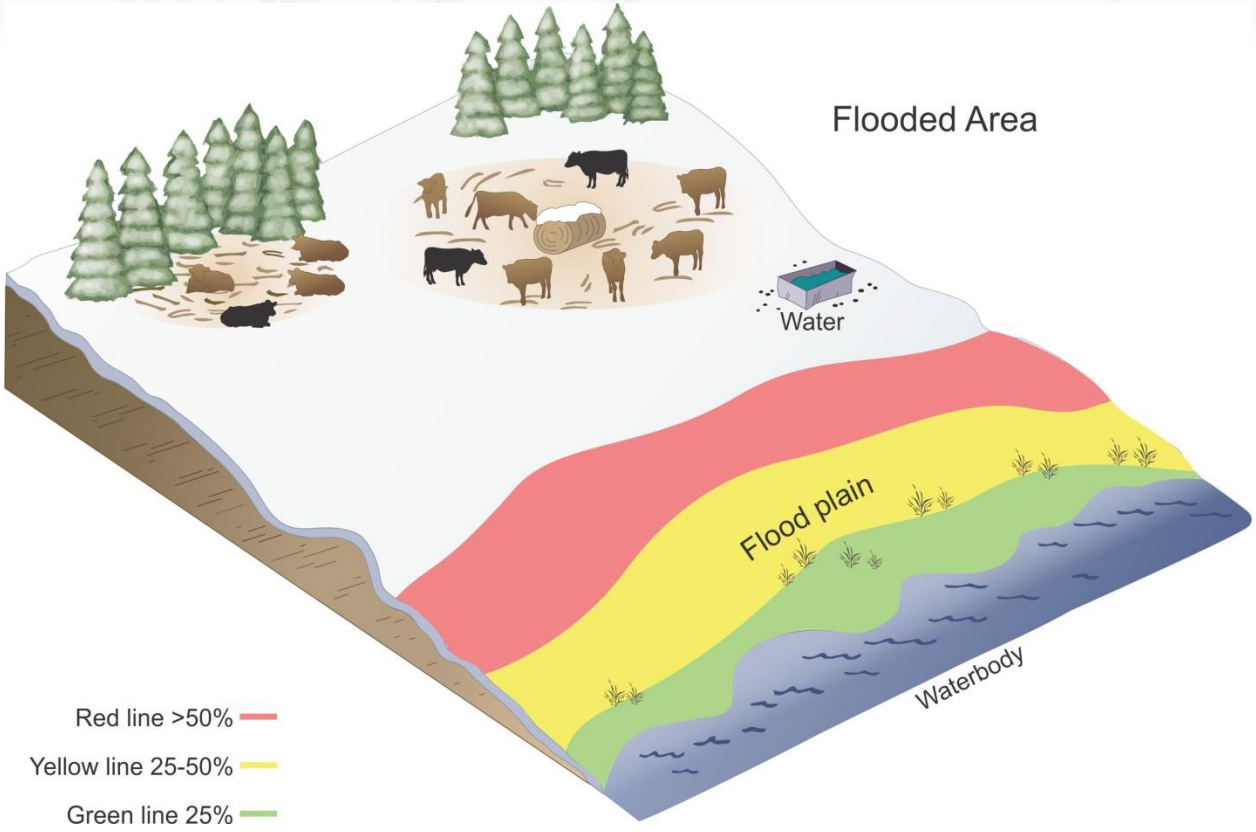
Wintering Site Assessment Tool

Site Characteristics
Slope Position of Winter Feeding Area



Wintering Site Assessment Tool

Site Characteristics
Flooding

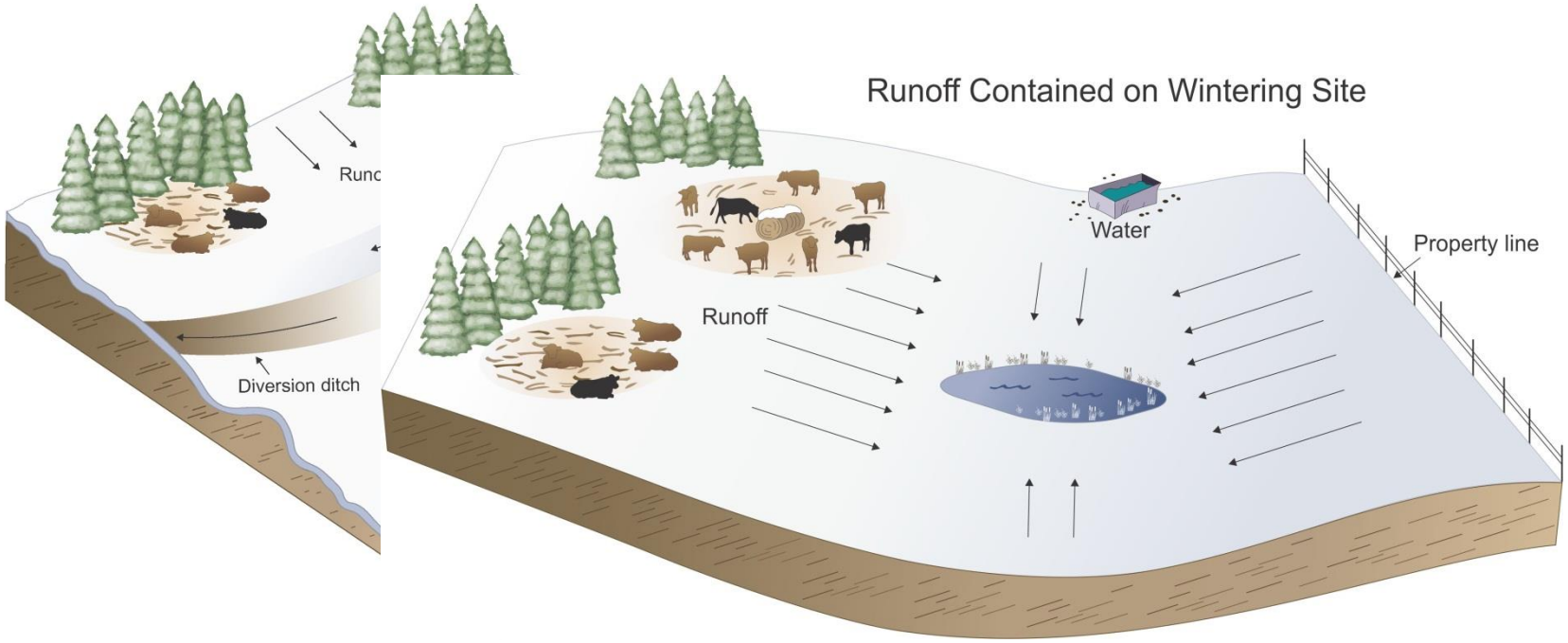


Wintering Site Assessment Tool

Site Characteristics

Runoff 2 Types

- Runoff leaving wintering site
- Runoff contained on wintering site



Feeding Systems

Frequency of Use – How often do you feed on the same wintering site?

Why is this important?

Remember the slide on available nutrients in the first year!

Less than once every 3 yrs?

Once every three years?

Once every two years?

Every year?

Bedding & Shelter Mangement

Types of Shelters

Bush / forested areas – Uncontrolled Access
- Controlled Access

Shelterbelts / Treed fencelines – Uncontrolled Access
- Perimeter fenced

Riparian Areas - Uncontrolled Access
- Fenced out

Portable shelters / windbreaks – Not moved during feeding period
- Moved at least twice

Permanent shelters \ windbreaks - Remove manure or not?

Bedding & Shelter Mangement

Types of Shelters

How often to move portable shelters?
SK. Water Security spreadsheet

- 120hd of cows behind 120 ft of portable windbreak
- Assume spend at least 4 hrs behind windbreak
- Assume protected areas is 10X Height (8ft) = 0.22 Acs
- Our Target is 1000 cow days/ac

∴ We have to move the windbreak every 11 days

Temp effect on feeding (Rule of Thumb developed by University and extension on enviromental study on beef cattle)
For every 1° ⇩ below 0° - 2% increase beef cow's TDN energy req.

Eg. -25° ⇨ 50% increase in cow's basic dietary energy needs

Water Source Management

Types of Water Sources for Livestock

Potential Concerns are linked to “where” feeding area is and how water source is linked to runoff

Water Sources

- Well
- Spring
- Dugout
- Natural Water Bodies (Rivers, Creeks, wetlands, sloughs)
- Snow

Post-Wintering Site Management

Do you have a plan?
Excessive manure build up?
How will you manage it?
Do you need to manage it?

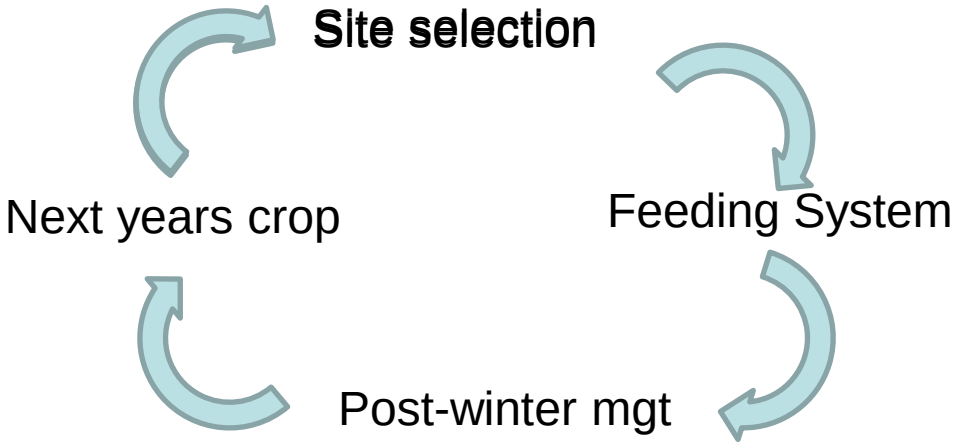
Has soil erosion taken place?
If so; is adequate vegetative cover in place?

Do you have a nutrient mgt plan?
Is it beneficial to soil test?
What will your rest period be before you bring back livestock?

All questions you will need to ask yourself to continue the wintering system cycle.

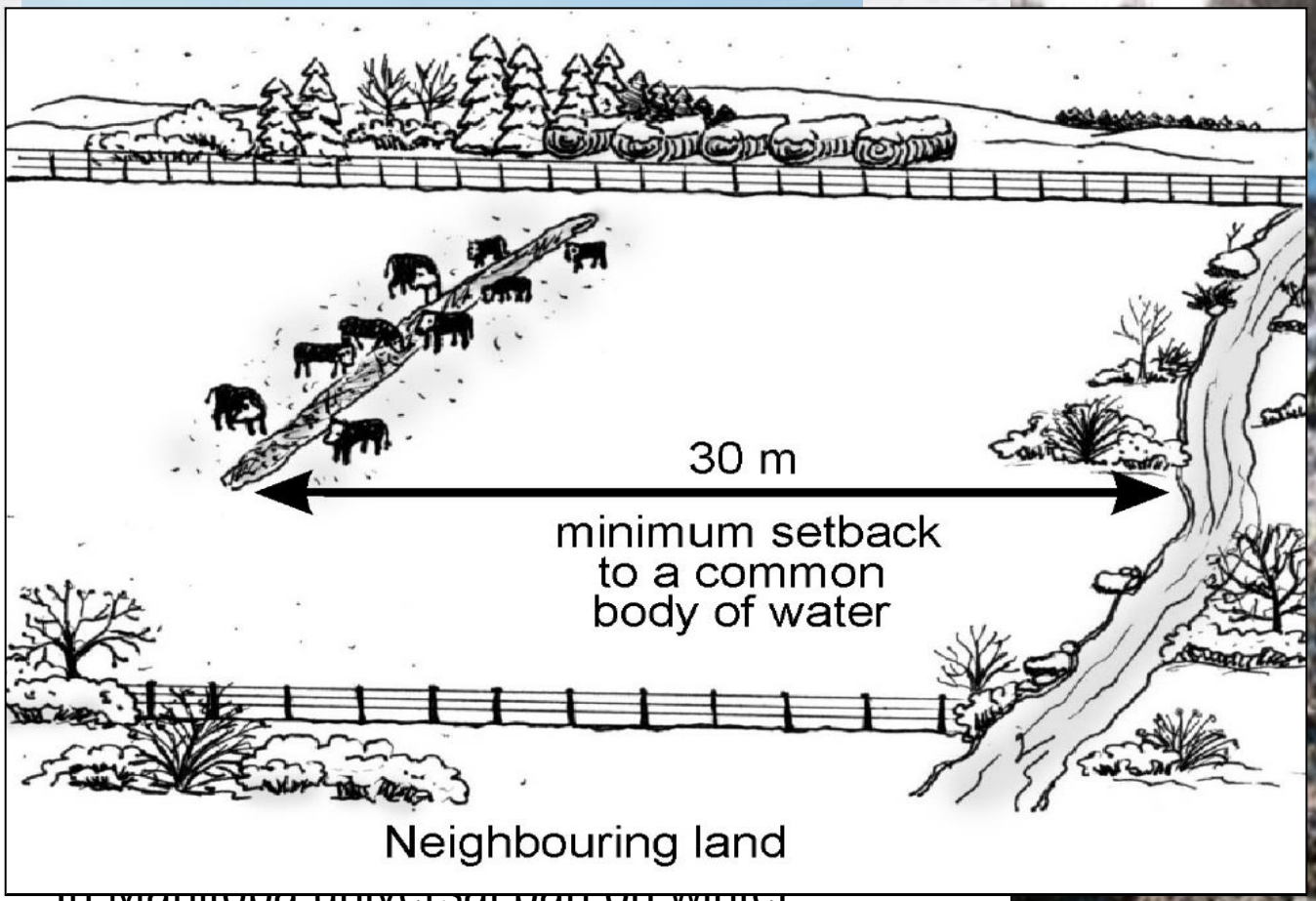
Post-Wintering Site Management

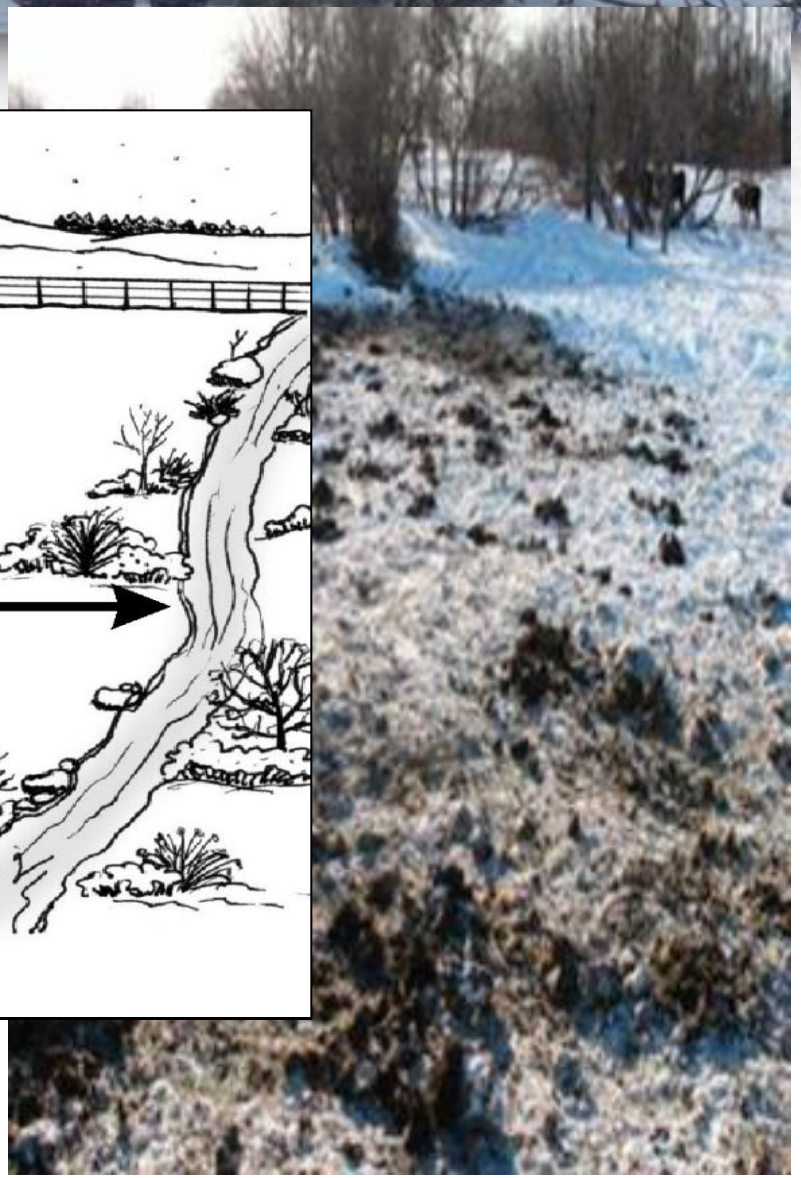
Wintering System Cycle



Wintering Site Management

Current and New Regulations





In Manitoba universal ban on winter

AOPA – wintering sites must be located at least 30m away from a common body of water

Nutrient Concentration / Acre

Table A2. Pg. 52

Table A2. Total Nitrogen Concentration/Acre based on Percentage of Feed Crude Protein Levels and Bale Density

		Bale Spacing Centre to Centre (ft)*								
		20	25	30	35	40	45	50	55	60
	Bale Density (#bales/ acre)	109	70	48	36	27	22	17	14	12
		Total N lb/ac based on 1500 lb bales and bale density								
Protein (%)	6%	1412.6	907.2	622.1	466.6	349.9	285.1	220.3	181.4	155.5
	8%	1883.5	1209.6	829.4	622.1	466.6	380.2	293.8	241.9	207.4
	10%	2354.4	1512.0	1036.8	777.6	583.2	475.2	367.2	302.4	259.2
	12%	2825.3	1814.4	1244.2	933.1	699.8	570.2	440.6	362.9	311.0
	14%	3296.2	2116.8	1451.5	1088.6	816.5	665.3	514.1	423.4	362.9
	16%	3767.0	2419.2	1658.9	1244.2	933.1	760.3	587.5	483.8	414.7
	18%	4237.9	2721.6	1866.2	1399.7	1049.8	855.4	661.0	544.3	466.6
	20%	4708.8	3024.0	2073.6	1555.2	1166.4	950.4	734.4	604.8	518.4
	22%	5179.7								
	24%	5650.6								
	26%	6121.4								

* For example, a bale spacing of 20 ft mean

		Bale Spacing Centre to Centre (ft)*								
		20	25	30	35	40	45	50	55	60
	Bale Density (#bales/ acre)	109	70	48	36	27	22	17	14	12
		Total P lb/ac based on 1500-lb bales and bale density								
Total Phosphorus Content (%)	0.08	111.2	71.4	49.0	36.7	27.5	22.4	17.3	14.3	12.2
	0.10	139.0	89.3	61.2	45.9	34.4	28.1	21.7	17.9	15.3
	0.12	166.8	107.1	73.4	55.1	41.3	33.7	26.0	21.4	18.4
	0.14	194.6	125.0	85.7	64.3	48.2	39.3	30.3	25.0	21.4
	0.16	222.4	142.8	97.9	73.4	55.1	44.9	34.7	28.6	24.5
	0.18	250.2	160.7	110.2	82.6	62.0	50.5	39.0	32.1	27.5
	0.20	278.0	178.5	122.4	91.8	68.9	56.1	43.4	35.7	30.6
	0.22	305.7	196.4	134.6	101.0	75.7	61.7	47.7	39.3	33.7
	0.24	333.5	214.2	146.9	110.2	82.6	67.3	52.0	42.8	36.7
	0.26	361.3	232.1	159.1	119.3	89.5	72.9	56.4	46.4	39.8
	0.28	389.1	249.9	171.4	128.5	96.4	78.5	60.7	50.0	42.8
	0.30	416.9	267.8	183.6	137.7	103.3	84.2	65.0	53.6	45.9

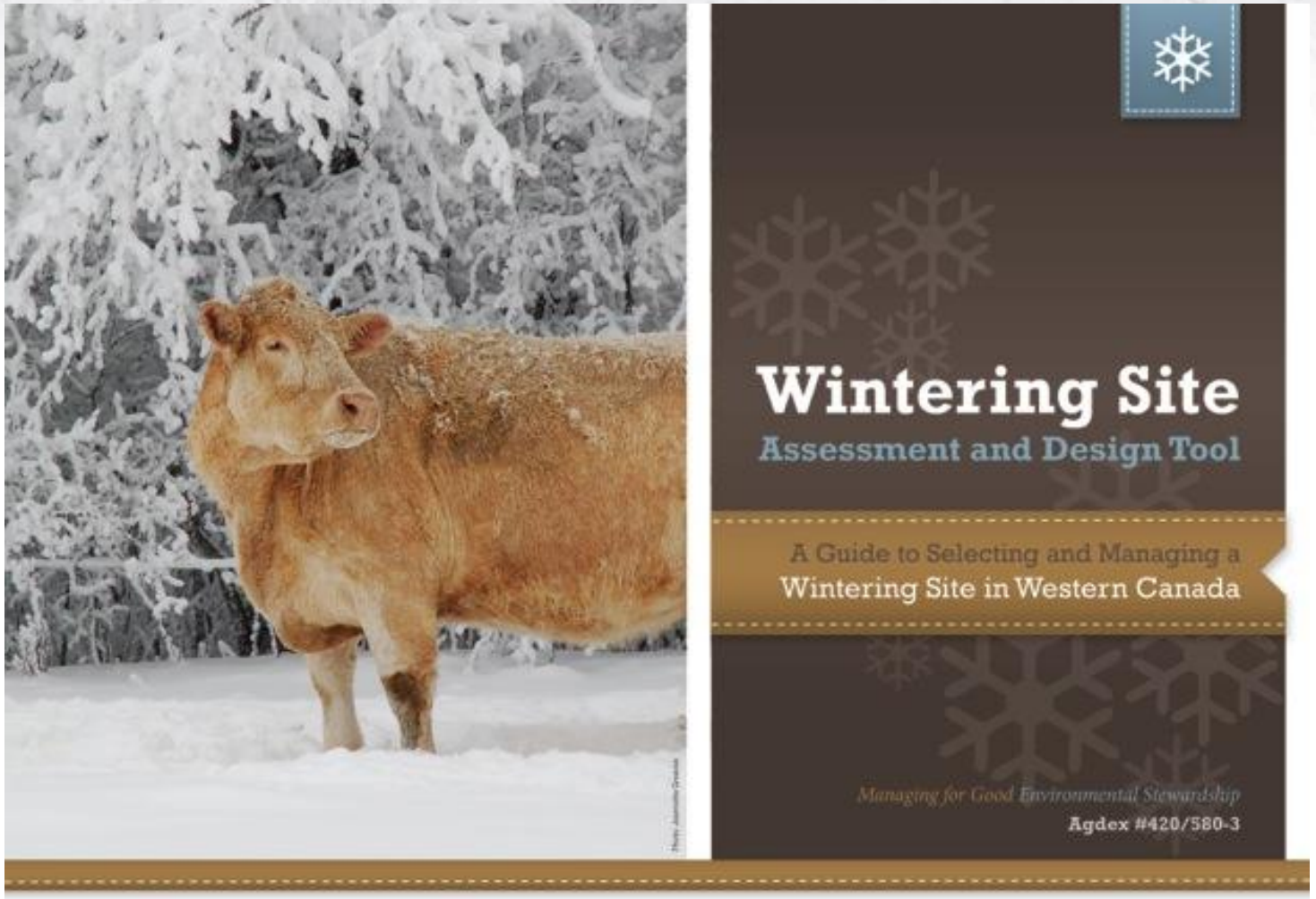
Nutrient Deposition / Acre

Appendix: Pg. 50-51

Table A1. Steps in Estimating the Amount of Feed Required and the Amount of Nutrients Deposited on land for the Wintering Season

Step 1. Calculate feed/day/animal Live weight of animal X Estimated feed intake/day (dry basis) = Amount of feed required/day/animal Example: 1400 lb X 0.025 = 35 lb of feed (dry matter)/day/animal _____ *lb x 0.025 =* _____ *(A)*
Step 2. Determine hay/other forage equivalent Depends on moisture content, best determined through a feed analysis – could maybe use an average of 15% for hay Example: Hay = 15% moisture content ; therefore 85% dry matter 35lb (DM) hay divided by 0.85 = 41.2 lbs of hay / day / animal _____ *(A) ÷ %DM =* ____ *(B)*
Step 3. Calculate feed wastes/day/animal Feed requirement (feed)/animal/day X Estimated feed wastes = Feed wastes/day/animal Example: 41.2 lb of hay/animal/day X 0.20 = 8.2 lb feed wastes/animal/day _____ *(B) x 0.20 =* _____*(C)*
Step 4. Calculate total feed required/day/animal Hay required/day/animal + Added hay to make up for wastage/day/animal = Total hay required/day/animal Example: 41.2 lb of hay/day/animal + 8.2 lb/day/animal = 49.4 lb of hay/day/animal _____ *(B) +* _____ *(C) =* _____ *(D)*
Step 5. Calculate total feed required/animal over the wintering season Total hay required/day/animal X Number of days on the wintering site = Total hay required/wintering season/animal Example: 49.4 lb of hay/day/animal X 200 days = 9880 lb of hay/wintering season/animal _____ *(D) X* _____ *no. of days =* _____*(E)*
Step 6. Calculate total feed required over the wintering season for the herd Total hay required/wintering season/animal X Total number of animals in herd = Total hay required/wintering season/herd Example: 9880 lb of hay/wintering season/animal X 100 head = 988,000 lb of hay/wintering season/herd _____ *(E) X* _____ *no. of head =* _____ *(F)*

Wintering Site Tool



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